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THE AIR LINE PILOT

In This Issue: **Why Compulsory Arbitration Won't Work**

The Air Line Pilot

JANUARY, 1959

Volume 28, No. 1

Entered as Second Class Matter at the Post Office at Chicago, Ill.
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Published Monthly by the Air Line Pilots Association, International, Affiliated with A. F. of L.-C.I.O. Publication offices: 55th Street and Cicero Avenue, Chicago, 38, Illinois.

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Annual Subscription, $2.50.

On the Cover

THE graphic photograph of airport approach and narrow gauge flush runway lighting system on the cover of this issue of The Air Line Pilot is an excellent portrayal of the effectiveness of the lighting system advocated by The Air Line Pilots Association.

The picture is of the new approach and runway lighting system at Dow Air Force Base, Bangor, Maine, a Strategic Air Command installation handling intercontinental and jet aircraft of all types, which was chosen to test the effectiveness of the systems.

Capt. R. A. Stone (UAL), Chicago, and Capt. R. C. Robson (AA), Washington, members of the ALPA Airport Lighting Committee, recently observed the operation of the lighting system at Dow. Capt. Stanley Anderson, (AA), San Francisco, is evaluating a similar system on the West Coast.

Capt. Robson reports the narrow gauge system at Dow is installed on a runway 11,640 feet in length. It is composed of flush "Elfaka," units placed 30 feet on either side of the runway centerline, 100 feet apart for a distance of 3,000 feet. Alternate rows are circuited so that both 100 and 200 foot spacing can be evaluated. Intensity may be controlled through a range of five steps.

There also is a 3,000 foot configuration A approach lighting system—the Capt. Ernie Cutrell system, also advocated by ALPA. Capt. Cutrell accompanied Stone and Robson to Dow. The approach lighting system includes Strobe lights providing the fireball of blue-white light moving in rapid sequence toward the centerline of the runway.

Capt. Robson reported that he and Capts. Stone and Cutrell observed the system in operation at night when the weather was "indefinite 100 feet, visibility ¼ mile." They watched aircraft, including the F-104, F3H, AD4, and B-52 make successful touchdowns.

Pilots who were using the system were unanimous in their praise of the lights. The one remaining need, they said, was for a lighter centerline, commencing where the narrow gauge stops, to provide guidance for the balance of the landing roll.

The Case Against . . .

Compulsory Arbitration

- It Often creates More Problems Than it Solves
- It Requires Management to Delegate its Rights
- It Deprives Employees of Fundamental Freedoms
- It's No Substitute for Collective Bargaining

By
Clarence N. Sayen, President,
Air Line Pilots Association

FOLLOWING the recent rash of strikes and lockouts in the air line industry, there have been a number of suggestions that the Railway Labor Act should be amended to provide for compulsory arbitration of disputes arising over proposed changes in rates of compensation, rules, and working conditions. These suggestions have come from some private citizens, the owner and publisher of an aviation magazine, a few individuals associated with air line management, and legislation has been proposed by Senator Spessard Holland, (Fla.), which would make it possible for the President to require arbitration.

Generally, these suggestions have not come from anyone who has had practical experience in processing problems under the Railway Labor Act or who has been a conscientious student of industrial relations in this country or other countries.

Historically, business management in the United States has been reluctant to surrender its management prerogatives to outsiders. Union officials have also been unanimous in their opposition to compulsory arbitration of disputes arising from proposed changes in rates of compensation, rules, and working conditions, although most of them over the years have gradually acceded to the compulsory arbitration of disputes arising from grievances or problems involving the application or interpretation of working agreements.

Generally, professional arbitrators and government officials with long experience in labor problems are also opposed to compulsory arbitration by legislation.

Reasons For Opposition

There are many reasons for this almost unanimous opposition from experienced and immediately affected persons to the compulsory arbitration suggestions. The reasons are sound and practical . . . not self-serving. They are reasons founded on experience as to the best methods of maintaining sound human relations and practical labor relations on a continuing basis. They are reasons based on a sincere interest in the long-run welfare of our economic system and our way of life.

On the contrary, the hurried suggestions from inexperienced or uninformed people that air line and railroad management and air line and railroad employees be forced into a system of compulsory arbitration represents the rather usual situation where the uninformed and inexperienced have the simple solution to complex problems, and for personal, political or publicity reasons rush in where the experienced fear to tread.

History has demonstrated that compulsory arbitration is not the protector of the public or the solution to problems between management and its employees that the uninformed anticipate. It is not a new idea. It has been tried in some industries and in other countries. The results for the public, management, and employees have not been satisfactory. Management has found that it may mean a wholesale delegation of its right to manage, to shape its own industrial relations program, to pursue its own management philosophy. It may mean that management is put into a straitjacket built upon the current thinking in government or arbitration circles as to what constitutes "standards" for the various employee groups.

It may find production and morale deteriorating badly and be comparatively helpless to do anything about it. It may find itself, as has happened many times, faced with more strikes, slow-downs, absenteeism, turnover, and other deterrents to maximum productivity over frustration and dissatisfaction with the delays and lack of results from the

Strikes Are Not Caused As Much By Issues As A Breakdown In Relations, The Author Says, And Suggests A Five-Point Program To Correct This

arbitration process, and with the feeling of being unable to do anything about serious problems.

Public Suffers Too

The public suffers from the foregoing as it suffers from any industrial strife. The suffering is aggravated when slow-downs, strikes, low morale, and low productivity become widespread and the character of an industry as has often been the case under compulsory arbitration. The public must view this in contrast to the present situation where industrial problems occasionally erupt into dramatic, well-publicized disputes and strikes, but prolonged interruptions of service are rare. The overall loss in man hours and productivity is infinitesimal today when compared to the uninterrupted periods of high productivity and high morale produced by voluntary agreements between the parties on issues in dispute or methods of resolving such disputes.

To the employees, compulsory arbitration means many of the same things that it does to management and the public. It means at the outset that employees are deprived of the very fundamental right to withdraw their service even after exhausting the long and tedious processes now required by the Railway Labor Act. It means that the employee is completely dependent upon the current thinking of the arbitrators in order to make any progress in the solution of what he considers vital problems.

Arbitration Provided Now

The Railway Labor Act as it presently exists provides for arbitration and goes into great detail as to the manner in which it will be conducted. But, it is arbitration which is entered into voluntarily by the parties as an appropriate method of resolving a particular dispute. As stated previously, arbitration is also utilized almost universally as part of collective bargaining agreements under the Railway Labor Act as the final and binding step, if necessary, to resolve grievances or disputes over application or interpretation of agreements. Again, however, it is the employment of arbitration on a voluntary basis to meet a specific need.

The negotiation of a collective bargaining agreement or its subsequent amendment under the Railway Labor Act represents the voluntary action of a management and a group of its employees in reducing to writing the basis for their working relationship. Although the Act makes available to the parties every process in common use for such purposes today (direct negotiation, mediation, arbitration, Presidential Emergency Board) in an effort to bring the parties to agreement, the agreement reached must be voluntary. This is fundamental to our free system.

The Act then requires that the parties, having reached agreement, also establish a means to resolve grievances or disputes over interpretation or application arising from the agreement. The parties have voluntarily enlarged these agreements over the years to provide for arbitration to break deadlocks which may occur in the dispute settling process.

It is obvious that arbitration has been available to the parties under the Railway Labor Act for many years and has been employed wisely and frequently to adjust disputes of all types. However, its use has been voluntary.

Arbitration Refusals

There have been a number of instances where management's refusal to arbitrate precipitated work stoppages. The 10 months' pilot strike on National Airlines in 1948, arose over management's refusal to arbitrate a discharge case. The 108-day withdrawal by the pilots of Western Air Lines in 1958, came after management refused a National Mediation Board proposal to arbitrate the remaining issues in a negotiation and ended by an agreement to arbitrate. In these cases, arbitration was available but one of the parties failed to make use of it. Strangely enough, no demands for compulsory arbitration were raised after these stoppages, but demands were raised this year after the employees in two instances refused to accept the recommendations of Presidential Emergency Boards and three work stoppages resulted.

In my opinion, the recommendations for compulsory arbitration under the Railway Labor Act are not well-founded and such action would not serve the best interest of the public, the management, or the employees. It could, on the other hand, be a tragic mistake not in the best interest of the public, management or the employees.

Work stoppages under the Railway Labor Act have been comparatively rare in comparison to total hours worked. They may occur only after exhaustion of long and tedious processes which afford every possible opportunity and known process to the parties to make an agreement, including the marshalling of public and official opinion. If the public interest is genuinely jeopardized, the President has authority to seize and operate the particular carrier. The fact is that the public interest has not been jeopardized even though the public has, on occasion, been inconvenienced. In the meantime, the voluntary system represented by the Railway Labor Act makes available to the parties every possible means of achieving and maintaining voluntary agreements, in a manner consistent with the theory of our free society.

Act Sound

The Railway Labor Act is basically sound. Its processes have proved to be

(Continued on Page 14)

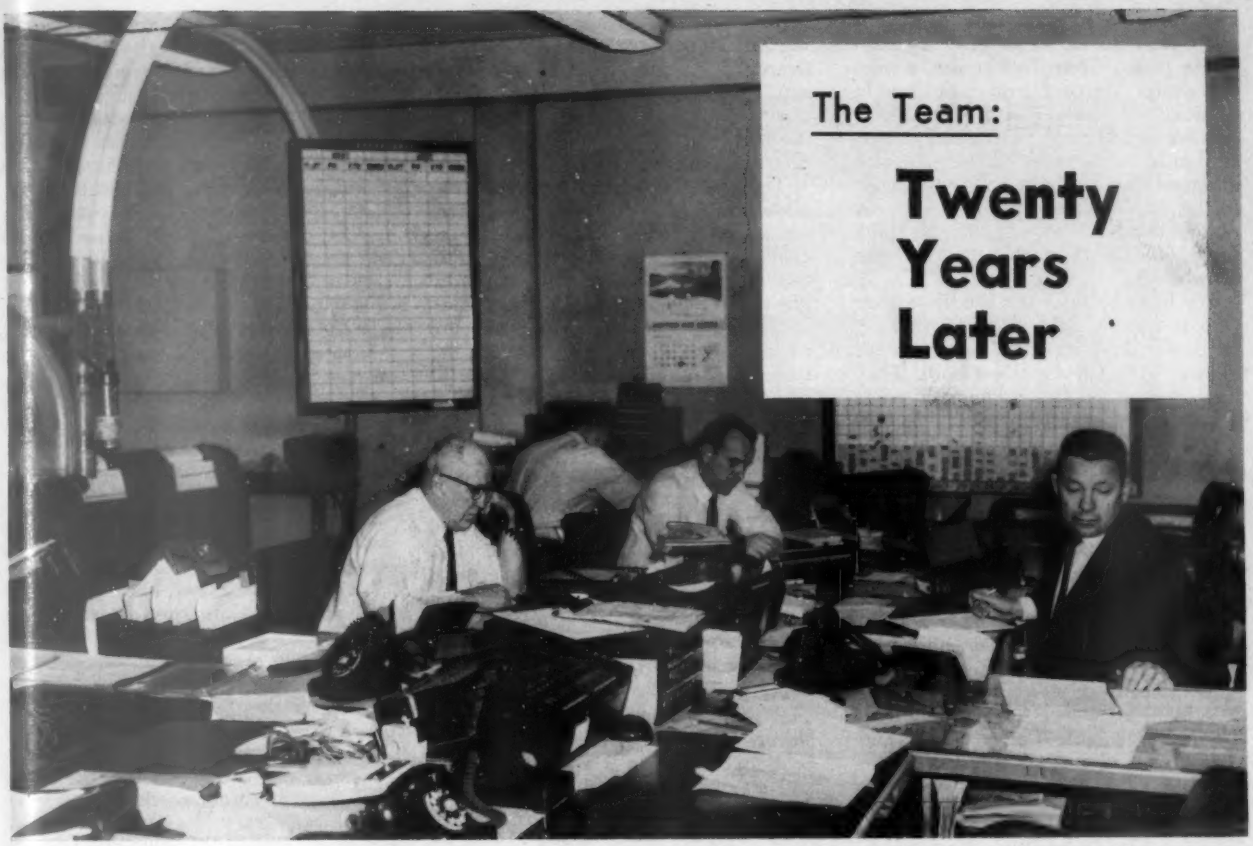
How Some Others View Compulsory Arbitration

Many people high in Government take a dim view of compulsory arbitration. They believe it creates a condition far worse than that it seeks to cure. There are, of course, many varying shades of opinion in this strata of thinking. Here is one of them from Secretary of Labor James P. Mitchell, as reported in *Aviation Week*:

"Labor Secretary James P. Mitchell has thrown cold water on legislation sponsored by Sen. Spessard Holland, (D.-Fla.), that would ban air line strikes and provide a compulsory arbitration of disputes. The experience of other countries, Mitchell said: 'Has been that they could no more drop government into the arbitration of a few private matters without government domination of many other private matters than they could drop a stone in a pond without causing ripples.'

"What inevitably follows from compulsory arbitration, Mitchell continued, 'is that government soon finds itself setting wage scales, fixing the conditions of work, determining hours, hearing grievances, and throwing its dictatorial weight around in other private matters.'

"Although compulsion was introduced in other countries to end strikes, Mitchell declared, 'it did not end strikes. What you find is a constant rash of hit-and-run strikes, day-long stoppages, slowdowns, etc. These are labor's way of protesting what they think unfair decisions from government. By the time they are dragged into court for striking, they are not on strike. Until the next day, when it starts all over again'."



The Team:

Twenty Years Later

Flight Operations Are A Team Effort. The Dispatchers Relation To The Pilot: To Advise And Aid Him With Information Upon Which To Base His Decisions.

By Bob Commerce, President,
Air Line Dispatchers Association

BACK in 1938, the national offices of ALPA helped a group of air line dispatchers organize the Air Line Dispatchers Association. Twenty years later, though many changes have taken place in the industry, evidence shows there is still close alignment between the pilot and the dispatcher. Not only on a national level, where close cooperation exists on legislative efforts and regulation writing, but also at the council level do we see the common interest in safety.

Many articles have been written about pilot-dispatcher relationships. Unfortunately some were hammered out in haste by people with a "mad-on," giving the impression of conflict of interest. Basically there is no conflict, unless it is an imagined one. Working year after year toward the same goal, which is a safe and economical operation, each has finally had to realize that:

(1) The dispatcher is not trying to climb into the cockpit,

(2) All pilots are not resentful of helpful advice from a man on the ground.

How far back must we go to recall a parallel? Air Traffic Control, for example. At first it was distrusted and resented, but eventually the service sold itself. And wow! Do you remember the old-timer pilot comments with the advent of GCA? Well, here is the dispatcher, a man with a job to do, but with the dual task of selling a service for 20 years to pilots as well as to his company. Before licenses were required, they had dispatchers. Many were pilots, operations managers, barnstormers who were trying to keep semblance of order in a loose operation. They had a lot of authority, too. In smaller companies they did hiring, firing, discipline, worked the radio, kept the books, did the purchasing, swept the floor. They were more often than not regarded as management, as railroad dispatchers are still considered.

Specialization

Specialization crept in when the operation grew, to the point that companies filled the dispatcher jobs with traffic controllers, station managers, radio men, flight instructors, meteorologists, etc., who had enough background to know the pilot's viewpoint.

Necessary qualities were alertness, unruffled calm, a service attitude, native intelligence and curiosity and firmness of purpose. Why firmness of purpose? Isn't this one of the things that often gets him in trouble with the pilot? You bet it is. It is damned hard to stand up to a pilot, especially when you may have your hand on his wallet.

We think the pilot is a strong-willed man, and he respects none but the strong-willed character in return. If the dispatcher isn't sure of himself, he isn't going to be of

any value to his company or to the pilot. How do we know this? By talking to pilots. Given free choice, a pilot will prefer the confident dispatcher in a sticky situation. That's the impression we get. He may storm and threaten, but if he is convinced the man who disagreed with him made an honest, forthright decision with the best information available, he will come to think more of him than the man he can browbeat.

We hold no brief for the dispatcher who is a pilot fighter any more than we do for the pilot who is a dispatcher fighter. Yup, they got 'em both. They have got to see the common interest, a safe operation and a profitable one. We can't solve all the personality conflicts. You know this, of course.

Common Interest

But the deeper we get into the subject, the more ALDA realizes that although generally good relations exist, we haven't even scratched the surface of real cooperation. We have a common interest in draft releases, legislation, labor matters—yes, even operations policy.

In Washington we work closely with Tommy Basnight, Larry Cates, and Captain Clark Luther. We have publicly supported Mr. Sayen's views in Congress. We had endorsed completely your rewrite of Part 60. Why? Is it coat-tail riding? No, it goes far deeper. The similarity of interests in common issues stems from the fact the working dispatcher is a pragmatic individual, like the pilot, who has to deal with safety matters on a day-to-day basis but is handicapped by the lack of a research organization to express his view, and even further hamstrung by the fact 90 per cent of the public never heard of his job. Until a few weeks ago, the transport editor of a leading trade slick thought a dispatcher was the man who waved flashlights out on the ramp, so help me!

To expand upon the current day pilot-dispatcher relationship, let us say we are not sure all pilots have an unclouded view of the picture. In addition to serving the company as the air line's watchdog, the dispatcher must fulfill his responsibility under the law as any licensed airman within the terms of his certificate. This means he must be honest; he must not fudge or try to conceal.

Watchman For Pilot

He is also there to serve the pilot as a dependable watchman. In this regard, he should do some leading. He is not a flight follower, really. Any clerk can do that. He must anticipate and forewarn the pilot of conditions that may affect his flight. It is wasteful not to utilize his services. In the hours before you get to the field, he plots and plans for your benefit. He has many trips to watch, more than you realize. Nevertheless, the CAA has repeatedly held that each trip is a separate entity and stands alone. Each must have as much service and attention as it needs or as the pilot may require. Workload is not a compensating factor. Each day the job becomes a little more critical because of ARTC demands upon the pilot's communication time. Yet through the use of *SELCAL and the forthcoming **AGACS, the dispatcher can render a worthwhile, needed service to the pilot. Indeed, one air line is weighing standard operational broadcasts for the dispatcher to notify pilots of changing conditions three times an hour.

What, if any, are the pilot's responsibilities to the dispatch center? We think they include reporting weather conditions concisely, in plain language, and early. This also helps your fellow pilots because dispatch funnels it to other ears. To be briefed, when briefing is indicated, since dispatch cannot initiate all briefing calls before trips. To de-brief, and this is an area that deserves much more consideration. To report positions with a reasonable degree of regularity, if it is only once in each ARTC control area. To report hazardous conditions wherever they exist and are otherwise not known.

Flight operations is a team effort. The Lonesome George character, whether he is a dispatcher or a pilot, does not contribute much to the effort. Rugged individualism had its day, and nobody today has any less respect for the hard-pants pilot who fought the elements in creaky crates because better facilities are available now.

What's happening to this team? Well, for one thing, the dispatcher finds himself with still another job to do. You might call it self-justification, for want of better words.

Substitute Control?

There are those who would substitute some kind of nebulous operational control or licensed dispatching. The sales-pitch might sound good to some, especially if they've crossed swords with some of our more resolute individuals. There are trends toward consolidations, resulting in reduced dispatch services, and it is only natural the weakened service angers the pilot. We even think some companies delight at setting pilots and dispatchers at each others throats, judging from operations bulletins of limited circulation.

Captain Luther, ALPA Region III Vice President, shrewdly sums up the efforts with this crystal gem to pilots: "Let's not deceive ourselves. Whether or not you like operational control, you're going to have it. Now, the question is, do you want ribbon clerks, porters, gas boys, or perhaps some government agency exercising this control, or do you want licensed company dispatchers of proven competency?"

Yours will probably be the choice. Think it over.

"In a bit . . ."

*SELCAL: Selected calling by use of a code—prefix.

**AGACS: Air Ground Air Communications System for Automatically reporting location.

Wind Shear:

Causes And Effect Of Rough Air Phenomenon

By Capt. T. H. Farnsworth

WIND SHEAR is the boundary layer between two winds of differing velocities. It can be horizontal or vertical, or it can lie in between; and it occurs in gusts, downdraughts, lee waves or any other air mass motion which is known to affect the performance and handling of an aeroplane.

Generally, turbulence of this nature is not hazardous and at worst it gives you an uncomfortable ride. But a good deal of airmanship is necessary to reduce the effects of turbulence upon flight characteristics, and it is a matter of concern that some types of wind shear are dangerous and must be treated with respect, particularly when the pilot is committed to some course of action near the ground during the take-off phase or on final approach. The aeroplane is then in its most vulnerable state.

A common type of wind shear occurs in fine weather areas and as a result of high pressure. It was originally noticed over the sea between 5,000 and 25,000 feet and it has often been encountered where winds are light and variable. Its effect on modern aircraft is to cause airspeed changes of as much as 10 knots over a period of ten minutes and to enforce the resulting speed for as long as half and hour provided height is kept constant. It may then revert to normal slowly and later change the other way, but there is no turbulance. Nor is there any visual indications of the cause, and for a long time it was thought to be due to large air masses rising or descending vertically. In the last ten years, however, it has been accepted that the phenomenon is due to the undulating motion of air streams. The effect is most easily explained by a simple diagram.

Undulating Mass

In Figure 1 in which it is assumed that constant pressure height will be maintained, the flight path is shown passing through an undulating air mass. At position A there is an upward component to the air mass and the angle of attack of the wings will therefore be reduced in order to maintain height; the airspeed will increase. At position B the aeroplane will be passing through an air mass moving horizontally and the airspeed will, on reaching this region, gradually return to normal. At position C there exists a downward component in the air mass flow, and some of the engine thrust will be needed to resist loss of height. The angle of attack of the wing must therefore be increased and the airspeed will be less than expected.

The cycle usually lasts for thirty to forty minutes, but it is possible to fly entirely through either the descending or the ascending part of the wave without experiencing the rest of the cycle, and this depends entirely on the direction of flight and the movement of the air mass.

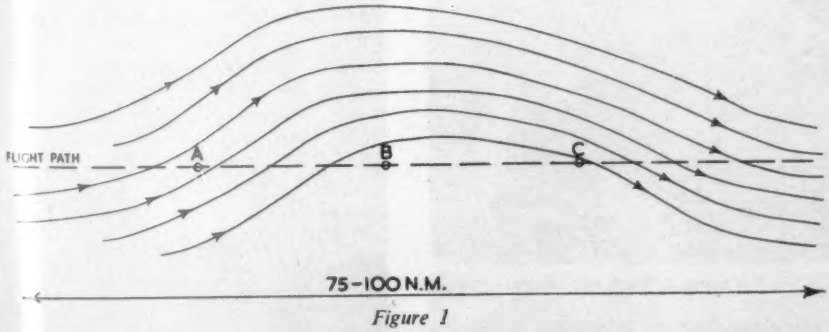


Figure 1

Mountain waves, which were described by Ernest Chambers, the Meteorological Superintendent, in a recent issue of Plane Facts, provides extremely marked examples of the phenomenon, and in Figure 2 it can be seen how changes in airspeed occur to an aircraft following a flight path at 11,000 feet through a wave. In the descending portion of the standing wave a modern airliner can lose as much as 25 knots.

The decrease in airspeed is usually more marked than the subsequent gain in passing through the lee wave region and, in fact, the airspeed is not likely to exceed the normal by more than 10 knots. The effect of the decrease in airspeed may cause pilots to suspect some vicious and invisible form of ice upon the wings and propellers. Tubulence, where it is encountered, is moderate in form for very short periods.

The phenomena described persist as long as the necessary conditions are maintained. Usually they are not more than 200 miles in extent, and the effects in general are mild; and it is because of the comparatively mild action that the aircraft instruments have time to indicate true flight conditions. In the rapid atmospheric changes which take place in the more vigorous types of wind shear, pressure actuated instruments of the altimeter and airspeed class become unreliable.

Meeting Wind Shear

Wind shear producing turbulence in the form of vertical and horizontal gusts is visible in the form of cumulus

(Continued On Page 10)

RESOLUTION From The Floor Is Heard . .

DELEGATES To 15th ALPA Biennial Convention Register . . . .

. . . CEEDING

. . DELE

. . . . SECRETARIAL Staff Of ALPA Convention At Miami Beach

VIEW OF ALPA tion Flo

Heard . .

SECRETARY Of Labor Speaks . . . .

. . . CEEDINGS Pondered By Delegates

. . . . FLOOR Discussion On Committee Report

. . DELEGATES Express Own Views

. . . . TWO Delegates Debate Proposition

OF ALPA tion Floor . . . .

REPORTS Of Standing Committees . . . .

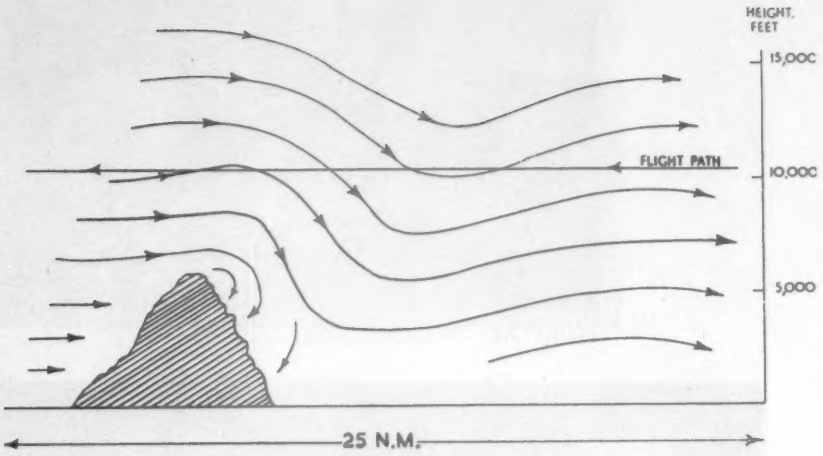


Figure 2

(Continued From Page 7)

type of cloud. In normal circumstances therefore, precautions can be taken to mitigate the effects of turbulence before flying through these clouds or the storms into which they develop. The first precaution is to enter the storm area flying within the proper gust design speeds which for each type of aeroplane is given as a "rough air" speed. The band of speeds for varying gusts for which the aeroplane is designed is shown in Figure 3, which is a typical gust envelope and is self- explanatory.

In designing an aeroplane to this gust envelope the object is to avoid structural damage due to the gust and, in addition, to prevent the aeroplane stalling. If an upward gust is met, it tends to stall the aeroplane, and Figure 3 shows that for an upward gust of 50 fps the mythical aeroplane will stall if its equivalent airspeed is less than about 160 knots and structural damage is likely if it is flying at more than 235 knots. The effect of the vertical gust is to increase the actual angle

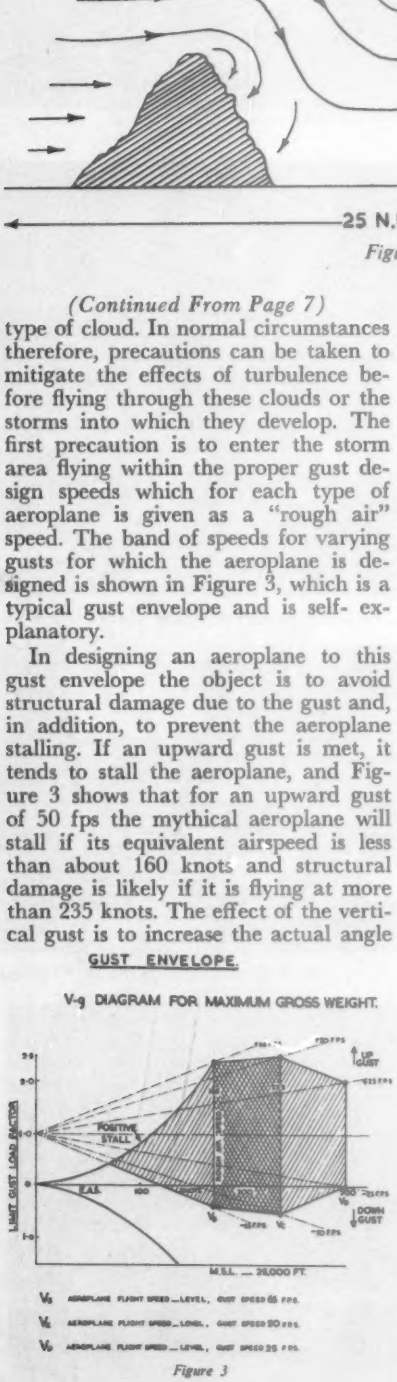


Figure 3

of attack of the wings if the gust is upward (positive), and decrease the angle of attack if downward.

Equivalent airspeed is the airspeed reading corrected for instrument error, position error, and the effect of compressibility. For structural purposes it is usually assumed that the vertical gust velocity increases linearly from zero to full value within a horizontal distance of 100 feet, and at an indicated airspeed of 200 knots at 20,000 feet (International Standard Atmosphere) this will occur in just over a fifth of a second. Clearly, gusts of various depths may be met since in storm areas they form part of a rotating system.

Another precaution to be taken is the setting up of the "artificial horizon" or "zero reader" instrument for maintaining a safe attitude. It should be appreciated that the angle of attack differs from the attitude according to the intensity and direction of the vertical gust. It would appear therefore that there is little point in following an attitude indicator, but this is not so because it must be remembered that the inertia of the aeroplane itself tends to maintain its momentum and in practice a single gust of great intensity is rarely isolated but occurs in conjunction with numerous other gusts of diverse velocities. The effect of inertia is important and inertia can best be described as the reluctance of the aeroplane to change its settled state, that is, its altitude and momentum, the latter being a product of mass and speed. Thus in flying through a storm the effect of one gust on the aeroplane's speed is very easily modified by the effects of the succeeding gusts.

Clouds and Storms

Cumulus clouds have a cellular construction. The vertical currents of storm clouds are not independent of each other but are part of a rotating system of air. At the top and bottom of each cell these currents become almost horizontal and adjacent cells may have air currents which tend to cancel out or to augment the horizontal components. If these horizontal gusts are imposed on the air mass in which the aeroplane is flying, they will affect the airspeed by a corresponding amount. The true airspeed is the aeroplane's speed relative to the particles of air forming the air mass in which the flight takes place. If a horizontal gust of 50 fps (30 knots) confronts the aeroplane from the opposite direction it will be seen that because of inertia the speed of the aeroplane relative to the new air mass will be its original airspeed plus the increase in speed of the new air mass particles. Gradually, of course, the airspeed will resume its previous value unless other gusts intervene. With a sudden tail gust there will be a corresponding decrease in airspeed, and once again, in the absence of further gusts the airspeed will resume its normal value.

Storms appear to consist of a number of cells in which air rotates, and they can develop by convection, through cold air undercutting warm moist air, and by cold air over-running warm moist air (Figure 4).

Thunderstorms created by convection are common everywhere, and to form they need a supply of humid air which, warmed by the sun, rises and condenses out into cloud. If the air aloft is cold enough the cloud continues to build up as convection continues to a great height. Initially ascending air currents predominate in the developing storm cloud but eventually the water droplets become too heavy to be sustained by the rising air and fall. Descending currents are then induced by falling rain or hail and the storm cell continues to derive its energy from

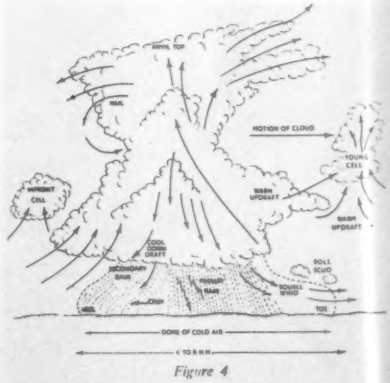


Figure 4

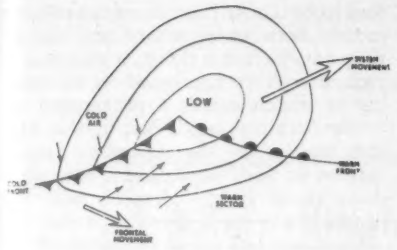


Figure 5

the ingress of warm moist air.

Ascending currents are much stronger than the descending currents in convection cloud storms, and although many deliberate flights into them have failed to reveal any dangers, there is a tendency as a result, to underrate all thunderstorms.

The mechanism of the frontal type of thunderstorm is similar to the convective storm, the energy being supplied by rising warm air at the frontal boundary. The storms of the cold front form on the surface of wind shear between the cold and warm air masses and have been investigated in at least one military project (Figure 5).

The severity of cold front storms depends upon the degree of instability in the warm air. The intial formation of the storms, on the other hand, depends on the amount of wind shear which itself is governed by the variation in air density on each side of the front. (Air density is controlled by the temperature, the humidity and the pressure of the air mass.) This results in convergence which provides the initial lifting of the warm air and starts the formation of the storm.

Ascending currents in such storms have been found to be very much stronger than the descending currents and few pilots investigating them have suffered more than temporary loss of control, and then above 20,000 feet. However, such fronts do produce heavy rain and hail which indicate the presence of strong downdraughts reaching almost to ground level (Figure 6).

The third type of storm is not frontal in formation. It may be induced in the first place by convection which triggers off the sequence of events producing the Nor'-Westers of Calcutta, the Sumatras of Malaya, the Tornadoes of West Africa and the Pamperos of Argentina. It is the type of storm which occurs wherever a warm humid air mass flows in beneath a cold, dry (and hence dense) current moving generally in the opposite direction. Once it begins to rain the overturning process accelerates by dynamic cooling and severe downdraughts are produced within the storm (Figure 7).

Because it has not been investigated as thoroughly as the convection or thermal type, much has yet to be learned about this kind of storm. It is, however, certain that it contains descending currents of exceptional severity and that the air rushing in to form the surface squall is supplied from the cold layer of air above.

All types of storm consist of a number of cells when fully developed. Generally successive cells attain greater heights than their predecessors and in the mature stage reach as much as 40,000 feet and sometimes much more, if conditions are favourable, such as in the Tropics.

Gusts At Any Height

Figures 4, 6 and 7 show an "idealised" section of the three main types of storm in process of development and it will be clear why flight at any height can encounter a bewildering succession of gusts in a very short period. There may be some significance in the characteristic "hook" which shows on the radar scope when viewing areas of a storm from which hail is known to be falling. Within the hail area which is normally very small, downdraughts must be strong and there is good reason to believe that this is a region of severe turbulence. A peculiarity of hail outfalls is that although confined in area they move erratically and appear spasmodically as the storm area sweeps across country. The onset of a downdraught may not be obvious until it is well established and the only cautionary sign may well be the glowering and formidable nature of the sky line.

Clear of the ground with conditions of climb, cruise or descent well established, a pilot is able to maintain complete control of any situation likely to arise in any of these storms. Control may, of course, mean avoidance but the initiative remains with the pilot.

Near the ground as on an approach, or even on the ground as in the take-off stage, avoidance may become impossible and the exercise of control very difficult. The take-off period is probably the most vulnerable stage of any flight and it is as well to remember that whenever atmospheric conditions are favourable for the formation of thunderstorms sporadic outbreaks are liable to occur in a region where other storms already exist.

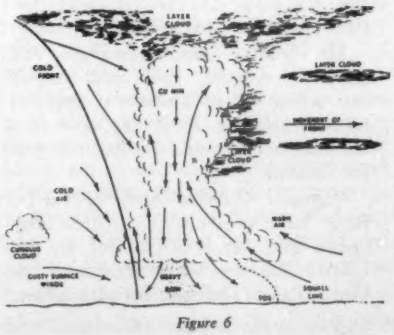


Figure 6

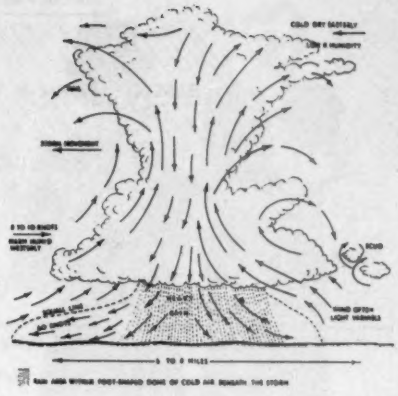


Figure 7

Precautions and Procedures

The downdraughts of a well established storm may scoop up surface air and lead to new cell formations. Such offshoots are frequently more violent than is the parent storm because the air fed in contains additional moisture as a result of previous rain. For this reason if it begins to rain in the direct takeoff flight path close to but separated from the main storm area, it is prudent to remain on the ground until it has passed away. However, it is quite possible that the first signs of this rapidly developing new cell will become apparent only after leaving the ground and Figure 8 gives an idealised but still representative picture of conditions along the flight path in just such a case as this.

As a general precaution in areas of wide spread thunderstorms the first power reduction and flap retraction should be delayed until airspeed has built up to a satisfactory minimum value with a comfortable angle of climb. Maximum continuous power should then be used until a safe height is reached and it must be realized that both speed and height, although subject to the pilot's discretion, are influenced very much by the type of aeroplane and its engines. When height gained is regarded as adequate, normal climb power can be selected.

In spite of all precautions the rapidity with which this type of storm can develop may well put a pilot in the position shown in Figure 8. The flight

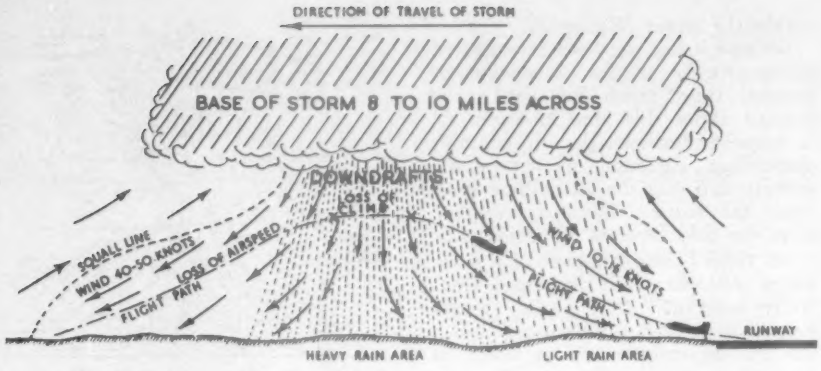


Figure 8

path traverses the squall area from heel to toe but with the modern aeroplane this should not take more than four minutes in the worst circumstances The first significant warning is likely to be *a marked reduction in airspeed and rate of climb* and there may be an actual loss of height with older types of airliner.

Maximum available power should be used as soon as possible and that means take-off boost and rpm for the engine and take-off rpm for the propellers. The airspeed may, of course, persist in falling even after applying maximum available power. Further action then becomes a matter of conjecture for much depends upon how near to the stall the airspeed approaches. The performance characteristics and effects upon handling of the type of wing flap fitted and the length of time left for flap operation are details known only to the pilot and no specific advice can be given here. In general, the use of wing flaps should be avoided as assiduously as should be this particular weather phenomenon.

During the approach phase the situation is simpler. The final approach is the critical stage but at least advice in the wind velocity at the threshold can be obtained. Gust values are also available and the wind gradient can usually be assessed by the degree of turbulence present during the approach. But in storms, as shown in Figure 8, conditions are not suitable for a landing and since they can be seen, it is just as well to wait until they have dispersed.

The chief source of danger on the approach is *wind shear* which, for simplicity, has been narrowed to either the shear caused by wind gradient or that due to gustiness. Because of surface friction wind strength tends to decrease as it gets nearer the ground and since the ASI measures the relative motion between aeroplane and the air mass in which it is flying, a progressive reduction in the headwind on the landing approach equals a progressive increase in a tail wind. But in this case the inertia of the aeroplane never catches up with events and if nothing is done about it the airspeed will fall progressively for a given attitude.

Gustiness has much the same effect, except in the hold-off phase where the effect of one gust can be relied upon to cancel out the after effects of its predecessor.

On an approach at a constant attitude a steady decrease in airspeed increases the rate of descent, warning of the impending "undershoot" being conveyed to the pilot by changes in the perspective of trees and buildings near the threshold. If this guidance is lacking, however, it is not difficult to undershoot in these conditions. The effects of wind gradient are overcome instinctively by the application of power except, of course, where height guidance is lacking because of the flat monotone approach which may be due to inadequate lighting or as a result of approaching over the sea.

Gusts are associated with fairly strong winds and in such conditions experience has shown that some extra speed is essential down to the threshold. How much extra is a matter of speculation, but half the gust value above the mean wind is normally used. The landing performance requirements cater for such adjustments.

(Reprinted From PLANE FACTS BOAC)

Meet Your Officers:

CAPTAIN ALLEN D. ADAMS of Braniff Airways, Inc., is the new Region IV Vice-President, the region encompassing Texas, Oklahoma, Kansas, Montana, Colorado, and Arizona, and he is a member of the ALPA Executive Committee.

Adams, 39, has served the Air Line Pilots Association on his Local Executive Committee at Kansas City, Mo., and has been council chairman and a member of the Braniff negotiating committees.

A native of Fairfax, Mo., Captain Adams, attended schools in St. Joseph, Mo., where he became interested in aviation after a ride in a Ford-Stout tri-motor, and the opportunity to see Lindbergh on tour.

Adams entered the Civilian Pilot Training program at Rosecranz Field, St. Joseph, Mo., in 1940, became an AAF cadet and was graduated from Brooks AFB, San Antonio, Texas, on Dec. 12, 1941. He was married the same day.

In four years of military service during World War II, Captain Adams served with the 11th AAF in the Aleutian Islands and was discharged as a Major in June, 1945.

He joined Mid-Continent Air Lines in August, 1945, and stayed on when Mid-Continent merged with Braniff in 1952. He now flies the Kansas City to Minneapolis run for Braniff.

Captain Adams and his wife, Bitte, have four children, three boys and a girl. He is a Lt. Col. in the USAG Reserve with assignment in Central Air Defense Headquarters, Richards-Gebaur AFB, Grandview, Mo., has attended law school at Kansas City University, and is interested in woodworking and swimming. Captain Adams is a member of the Military Order Of World Wars.

Allen D. Adams, V. P. Reg. IV

Before Kittyhawk:

A Day Of Decision

By James R. Custin

If You Want To Know What Really Happened Then, Go Back To May 6, 1902 And Plug In On This Conversation.

WILBUR: I've been doing some thinking and I don't believe this airplane idea we've been working on is such a good idea. Best thing to do is to forget it.

Orville: You going ape on me or something? Those glider tests we made last month were perfect. We've got our airfoil and propeller theory wrapped up cozy, we've got the stability and control problems flat on the mat, and our gas engine is all finished and is just what the M. D. ordered. Man, we've got it knocked.

Wilbur: Yeah, but what about flying it?

Orville: So what's the problem? That stick and rudder control arrangement you worked out is a honey. You give a student eight or ten hours of dual and he's fat.

Wilbur: Sure, but what'll be happening during those eight or ten hours? The student is sitting there pushing those controls through little bitty movements and the instructor is yelling at him, "You're overcontrolling, you're using much too much pressure, let's not try to turn this bucket inside out." Then he's taking it nice and easy on the stick, coming in for a landing and the instructor will be yapping at him to get that stick back, get that stick back, are you waiting until we bounce over the hangar? The poor student will be working like a dog and going rapidly nuts, and meanwhile the instructor sits there telling him relax, ree-lax! Hah! A flight instructor would be good for barely four hours before some student would kill him in cold blood. No sir, flying just wouldn't be safe, and that's all there is to it.

Orville: Well, maybe you've got a point there. But somebody would be learning to fly or where did you get that flight instructor from?

Wilbur: So all right. So we invent the airplane and people learn to fly it without doing violence to each other. Then they're going to want to use it in 500 and 1 conditions, and that means the pilot will have to fly the thing strictly on gauges. To figure out which way is up he'll have to be watching five different needles, all of them telling him something different. It'll drive him crazy. Besides, how will he know where he is?

Orville: Easy. We'll have us a radio navigational aids system. We'll also have a bunch of people on the ground to give the various airplanes clearances so they won't tangle with each other while they're ginning around in the soup.

Wilbur: Yeah. And some day some poor birdman is going to be sitting up there in a holding pattern east of the south leg of one of your radio ranges with an expected approach time ten and one-half minutes hence. He's got one ear on approach control and one on the range, and he's trying to bracket the leg to get his crab angle so he can figure the wind. While he's working out his headings he has to maintain his airspeed and altitude and figure out one minute for each turn is two minutes, and I've got two two-minutes legs in another four minutes totals six, and ten and half less six is another four and a half minutes to kill. Meanwhile, approach control is telling him to let down to three thousand, report leaving each thousand foot level.

Orville: I see what you mean, boy. If God had intended for man to do all that mental arithmetic He'd have given him an adding machine instead of only ten fingers.

Wilbur: Roger dodger. Now you see why I'm saying that the idea of inventing the airplane is silly when you look at it right.

Orville: Affirmative. Best we forget the whole thing. Let's go burn the shop down.

Wilbur: Lead on, Lad. I'm bringing the matches.

* * *

And that is why, in June, 1902, Wilbur and Orville Kediddlehoffer founded the biggest buggy whip factory east of the Mississippi.

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(Reprinted Courtesy Air Facts)

A Five Point Program To Improve Air Line Collective Bargaining . . .

(Continued From Page 4)

effective. The record under it is good. Comment on this subject, however, would not be complete without some specific recommendations for improving industrial relations under the Railway Labor Act.

It is my view that the greatest area for improvement of industrial relations under the Act lies in the parties subject to it learning to utilize its processes more efficiently in the solution of their problems and in reviewing their personal and institutional conduct toward this objective. A study will demonstrate that breakdowns in industrial relations under the Act take place consistently with the same managements and the same employee groups. These groups monopolize the staff and time of the National Mediation Board and often utilize the processes of the Act to avoid solving their problems rather than to help solve them.

The delay and inevitable deterioration in relations results in grave industrial strife and such an impasse that even the simplest problems cannot be resolved by the parties. *No change in the Act will resolve these problems.* The parties must either change the essential character of their approach to industrial relations problems or change the personalities now frustrating the process.

Thousands of disputes are resolved annually under the Railway Labor Act where the parties have learned to use its processes wisely, but these occur quietly and peacefully and do not come to the attention of the public.

Specifically then—

▶ The parties should learn to utilize the Act and its processes for the solution of their problems—not for the purpose of delaying or avoiding a solution.

▶ Those organizations who find themselves in chronic industrial relations chaos should examine their own character and practices to find remedies.

▶ Parties to difficult disputes should be imaginative in employing new and varied techniques and methods in finding solutions. The Railway Labor Act is most flexible in this respect.

▶ The parties should not delay the processes of the Act. An industrial relations problem seldom improves with age, especially not in an inflationary and expanding economy. Too often the parties have failed to negotiate effectively until the Act's processes (even including a Presidential Emergency Board in some cases) have been exhausted and a strike date has been established or is imminent. This is a dangerous and impractical practice. Relations may have deteriorated by this

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time so that the ability to negotiate effectively is lost. The issues may be obscured or altered by interim developments. And, too often, preparation for war results in war because of its own momentum.

▶ Management should realize that industrial relations problems are human relations problems within their own family which, like most family problems, require daily attention. The problems cannot be ignored for long periods and then resolved in an impersonal manner with "the union" by the methods utilized with another corporation. The atmosphere, habits, and basis for resolving such problems must be fostered on a continuing basis. Continuing relations between the parties must be based on such a strong foundation of mutual respect that the personalities involved will be extremely reluctant to permit any disagreement to disrupt them.

The foregoing recommendations will, in my view, produce more harmony in the aviation industry than coercive or ill-advised legislation.

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